White Paper

Smarter Solutions for In-Vehicle Signage and Infotainment

The global trend of rural-to-urban migration has become more and more obvious. For many people, living in metropolitan areas means greater reliance on cars, buses and trucks. People end up spending more time in vehicles going from one destination to another. With development of state-of-the-art in-vehicle infotainment (IVI) systems, vehicles are now capable of providing users real-time information, entertainment and network computing services, creating new business opportunities and usage models.

Utilizing compute technology for in-vehicle signage (such as a fare-card reader) and infotainment still has its challenges though. This paper examines how an industrial-grade solution can be deployed with in-vehicle digital multimedia applications to provide rich multimedia content using the Intel® Atom™ processor E600 series for instant information and entertainment delivery.

True Multimedia Handling

Due to space limitations, in-vehicle signage and infotainment systems are small in size and display graphics and video, rather than words, to deliver clear, visual messages to passengers. With the ever-growing demand for multimedia content, the Intel® Atom™ processor E600 series is designed to provide enhanced graphics performance and includes a video hardware decoder that assures full high-definition (HD) video playback and megapixel images which live up to today's end-user expectations.

This processor incorporates the Integrated Intel® Graphics Media Accelerator (GMA) 600 GPU, a power-optimized 2D/3D graphics engine that provides up to 50 percent better performance than the previous generation solutions[1], enabling the system to handle rich multimedia content. Moreover, the graphics engine provides full hardware-accelerated HD H.264, MPEG-4, VC1, and WMV9 decode, and for the first time, hardware encode of MPEG-4 and H.264. The video hardware decoder supports H.264 baseline, main and high profile, up to L4.1 level. Such brilliant multimedia handling capability enriches user experiences and improves high quality in-vehicle information and entertainment.

Energy Saving Design

In response to environmental concerns, Intel has developed the Intel® Atom™ processor E600 series to deliver low-power consumption. This is important since an in-vehicle system is powered by a vehicle's battery and power draw is always a consideration when specifying a solution of this type. Unlike full power Intel® architecture (IA) solutions, the Intel® Atom™ processor E600 series can be used with third-party chipsets and perform as a stand-alone system-on-chip (SoC) without an accompanying chipset. This Intel® Atom™ processor-based SoC is available at speeds of 600 MHz to 1.6 GHz, offering a good balance between performance and power, as well as providing the scalability to address a wide variety of applications.

1 Source: http://embeddedinnovator.com/built-for-embedded-the-new-intel-atom-processor-e6xx-series

The integrated system management controller takes care of the complete platform start-up, state-transitioning and power-down procedures. It operates autonomously and reduces the overall system power consumption when entering stand-by or power-down modes. This processor uses Intel's 45nm high-k process to keep power consumption down to just 2.7 to 3.9 watts[2], which is considered excellent performance-per-watt. This scalability makes the Intel® Atom™ processor E600 series ideal for both high-end and low-end vehicles.

Extended Operating Temperature

In order to withstand extreme environmental conditions, vehicles have been designed to operate in a wide range of temperatures, making this a key criterion for in-vehicle computing deployments as well. For a number of years, NEXCOM (an Associate member of the Intel® Embedded Alliance) has offered a comprehensive range of in-vehicle solutions, including telematics PCs and rugged mobile computers. For its latest generation of in-vehicle infotainment solutions, NEXCOM has chosen the Intel® Atom™ processor E600 series for its support of a wide range of temperatures. Its cutting edge technology is combined with careful component selection and a mechanical design which dissipates heat to give the new platform an extended operating temperature range of -20° to 70° C.

Expansion for Arbitrary Application Requirements

It is hard to predict all desired product functionalities at the development stage. For this reason, expansion capability for arbitrary application requirements has become essential in in-vehicle designs to allow greater configuration flexibility. A good example of such a design is NEXCOM's compact rugged in-vehicle computer, the VTC 1000, which is differentiated by a multitude of I/O interfaces that enable connectivity to a variety of in-vehicle features. The VTC 1000 fanless in-vehicle computer features interface connections, such as VGA, TV-out and LVDS, that address in-vehicle infotainment and digital signage applications. Other features which are specifically incorporated for application expansion include a PCI-104 slot for CAN bus or COM port and Mini-PCI Express® WLAN/3.5G modules.

Vehicle Power Management

In-vehicle infotainment systems rely on vehicle power to activate the system. However, power fluctuations and spikes occur when a vehicle is switched on and off. In order to ensure the in-vehicle system can be turned on in a safe mode, a power delay function allows the system to be activated a few seconds after the transient voltage condition.

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2 Source: http://embeddedinnovator.com/built-for-embedded-the-new-intel-atom-processor-e6xx-series

In addition, power control features provide better road management for vehicle tracking with uninterrupted power support. Vehicle tracking has become the backbone to mobile business, enabling users to change the way that vehicles on the road are managed and driven. Again, the VTC 1000 is a good example here. With a backup smart battery, the VTC 1000 is capable of running continuously when vehicle power is temporarily off. For instance, when a vehicle is filled up with fuel, the vehicle must be turned off for few minutes; with its backup smart battery, the VTC 1000 car PC assures continuous recording of vehicle tracking during this period.

Mobile Network Connectivity

With an integrated wireless network modem, users can utilize mobile network connectivity to conveniently achieve real-time information updates. There's no need to wait anymore for content updates – vehicles can be used right away on schedule. Even when a vehicle is off, the in-vehicle system can be activated by a remote wake-up feature using short message service (SMS). When the system is awakened from a remote site, content can be transmitted through 3.5G wireless connectivity and updated easily. Once the update is completed, the system can be automatically turned off. Mobile network connectivity has provided users the most convenient way to immediately update information no matter how far away the vehicle is located.

Figure 1. With integrated wireless network modem, the VTC 1000 in-vehicle computer can be activated by remote wake-up feature using SMS.

Figure 2. Content can be easily transmitted and updated through 3.5G wireless connectivity.

Conclusion

Car manufacturers looking for new ways to compete should invest in the more advanced IVI systems that today's car, truck and fleet buyers seek. Equipped with the Intel® Atom™ processor E600 series, the VTC 1000 is a prime example of the type of platform on which to base such an IVI system. It is capable of handling the rich multimedia content today's users demand. Furthermore, the platform's low power consumption design makes NEXCOM's in-vehicle computer a green product. In addition, hardware designs, various expansion options, and smart vehicle power management, make the VTC 1000 car PC an ideal in-vehicle signage and infotainment hardware platform, providing a real advance in in-vehicle computing.

About NEXCOM

NEXCOM International Co., LTD., an ISO-9001-certified company and a member of PICMG, PCI-SIG, and the Intel® Embedded Alliance, is at the forefront of the competition by offering OEM, ODM and OBM designs for products such as innovative blade servers; network security appliances; industrial and embedded PC products such as single board computers, embedded boards and systems; CompactPCI CPU boards; industrial-grade server boards; and customized platforms. Established in 1992, NEXCOM has since won several patents, awards, certifications for its high-quality products and service that meet international standards and worldwide customers' requirements. To serve its worldwide customers well, NEXCOM, headquartered in Taipei, Taiwan, has set up seven subsidiaries in the United States, the United Kingdom, France, Italy, Germany, China, Japan as well as distributors in the other parts of the world.

About the Intel® Embedded Alliance

The Intel® Embedded Alliance is a global ecosystem program dedicated to providing OEMs and developers with the advanced hardware, software, tools, and systems integration they need to advance innovation, set new performance standards, and speed time to market. Learn more about the Alliance at: intel.com/go/eca.